# HEARTS AND MINDS

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**A new collaboration between scientists and the Nash Ensemble hopes to shed light on how our brains respond to music, and why we love it.**

"Birds whistle, man alone sings, and one cannot hear either a song or an instrumental piece without immediately saying to oneself: another sensitive being is present." The author of this sentence, Jean-Jacques Rousseau, remains best known for his political and moral philosophy that later inspired a revolution. But his thoughts on music were just as prescient of an aesthetic revolution that would lead to music being raised from the lowly place it occupied during his lifetime - that of poetry's "handmaiden" - to the position it took during the 19th century, as the highest, most noble, most humane of the fine arts.

Rousseau was preoccupied with the encroaching materialism of his age, which sought, as he saw it, to diminish human beings to the status of slavish automatons. He wanted to show that music could not be reduced to a mere play of the senses, but rather that its power derived from the way it could answer and reflect the unbounded desire which measures man's difference from his animal ancestors. But his great adversary, the composer and theorist Jean-Philippe Rameau, had already demonstrated that our innate attraction was a simple matter of physics. Hailed as the "Newton of music", Rameau managed to bypass millennia of Pythagorean number-crunching with proof that the rudiments of the western harmonic system could be found resonating as upper partials - harmonic overtones - in a vibrating body. The power of music, argued Rameau, comes from the resonance between the instruments we hear and the naturally formed "instruments" of our bodies.

Modern science, unsurprisingly, comes down squarely on Rameau's side, finding that our seemingly innate sense of musical harmony - as well as our awareness of pulse and rhythm - provides an important reason why we find pleasure in the apparently purposeless activity of playing and listening to music.

This was one of the findings from a recent collaboration between the University of Edinburgh's Institute for Music in Human and Social Development and the Nash Ensemble, a London-based chamber group. In a programme planned as a residency during which musicians and scientists could exchange and deepen ideas, delegates were treated to a series of concerts and lectures under the rubric "Great music and why we love it".

The Nash Ensemble is among the world's great chamber groups, capable of giving its core repertoire the level of grace and insight one more usually associates with excellent string quartets such as the Amadeus or the Budapest. With the ensemble given a chance to play Beethoven's Septet and Schumann's Piano Quintet, among others, to an intimate group of attentive aficionados, there was little risk of disappointment.

So much for the great music, but what about why we love it? Do recent advances in cognitive neuroscience really allow us, as the organisers claim, to give a satisfactory explanation for music's mysterious charms?

Many of the recent findings of research into the neuroscience of music are extremely compelling. It has become clear, for example, that musical experience provides a crucial and not necessarily replaceable stimulus to our cognitive development, and forges links between the different areas of our brain responsible for hearing and movement.

Much fuss was made some years ago about the so-called "Mozart effect", and the idea that listening to Mozart's music could lead to lasting improvements in our memory and other cognitive powers. While this remains unproven, and numerous doubts have been cast over the validity of the original experiments, evidence does suggest that attending to music can result in temporary improvements to our short-term memory.

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More importantly, the ways we process larger-scale musical events - such as phrase repetition and developments, modulations and unexpected turns - all rely on activity in the same part of the brain we use for decoding syntax in ordinary language. It remains unclear what, if anything, is being communicated, but the old adage that music is a universal language is nonetheless shown to have some grounding in scientific fact.

On a deeper level, musical activity also affects the small area of the brain called the amygdala, which is primarily responsible for generating the danger signals that prompt us, in evolutionary terms, to take extraordinary measures to guarantee our survival. According to Stefan Koelsch of the University of Sussex, this suggests that the commonly assumed link between music and emotion is a matter of quantifiable fact. The key here may lie in the way that music, in both its small-scale and large-scale processes, typically involves movement between tension and resolution, dissonance and consonance - and that it is our awareness of the disharmony in our auditory environment which triggers our emotional responses to music.

Yet the observation that music moves us, central to the accounts of the art in both Plato and Aristotle and more or less continuously ever since, hardly seems groundbreaking. Koelsch readily admits that if there is an advance in knowledge here - which clearly there is - then the progress relates to neuroscience more than to music. To the layman, the idea of neuroscience conjures up an almost mythical understanding of the brain, in which all its perceptions, emotions and thoughts can be accounted for in terms of minute, lightning-fast electrical signals between synapses, cortexes and mysteriously named regions such as the nucleus accumbens and the corpus callosum.

In reality, despite the advanced technological wizardry of the equipment this area of research uses to measure and analyse brain activity, the state of cognitive neuroscience is still at a basic level. Think of those satellite images of Planet Earth that show human distribution and activity through the levels of artificial light generated. You can do a great deal with such a map in the way of geo-economic analysis. But when it comes to discovering what is being read, eaten and thought under those lights, you will most likely find the satellite map a somewhat rudimentary tool.

This is not to say that neuroscience has no uses in explaining music and the value we attach to it. On the contrary, the link between the way we experience musical structure and the way our ears were originally conditioned to monitor our environment for danger and desire should certainly have an important role to play in our understanding of how and why the musical practices we now encounter (in the form of sound waves, radio waves and hexadecimal numerical systems) originally evolved.

Oddly, Rousseau was one of the first to posit the idea that music plays a critical role in our evolutionary development, arguing that music and language arose as affective signifiers in response to our awareness of and desire for other individuals. Far more than a meaningless play of the senses, the significance of musical sound derives from the representation of that most elusive of all structures: the human subject itself.

Ultimately, a mixture of evolutionary and cognitive science will be able to explain the entire range of human striving in terms of sublimation of our need to sustain and reproduce ourselves. The important thing, however, is not that our lives permit reduction into such terms so much as that our values, desires and subjective identities take the qualitative forms they do. Part of the advantages of an aesthetic account of music such as Rousseau's is that the value of music can be related not to our animal nature, but to the entire history of subjectivity. Music affects us so strongly, in other words, because it quite literally lends form to our lived experience, answering to our desires in their most sublimated, socialised state, while seeking out our most visceral, primordial responses.

When we hear music, we hear that another sensitive being is present. The proof of this is, in the best tradition, strictly empirical: people have been discerning this in the music they love for centuries. Whether we will eventually be able to see this process happening on a magnetic resonance imaging scan, however, is another question entirely.